

A Global Perspective of the Impact of ICTs on Economic Growth and Democratic Freedom

Farid Shirazi

Ted Rogers School of Information Technology Management,
Ryerson University, Toronto, Ontario, Canada

f2shiraz@ryerson.ca

Abstract- In recent years, we have observed a growing number of socio-political movements across the globe using tools and services provided by Information and Communication Technologies (ICTs) to participate in democratic discourse and mobilization. The increased level of citizens' participation in communication discourse using social networking sites and blogs is an indication of the role of ICT tools and services, particularly the Internet, in today's communication landscape. This empirical study uses archival data for 146 countries across the globe for the period 1996-2010 to investigate the impact of ICT expansion and other determinant parameters such as education, the rule of law, Gross Domestic Product (GDP) and institutional resistance on democratic freedoms on a global scale. Some of the important findings of this study reveal that ICT positively influences democratic freedoms across the globe and that while the global digital divide in basic telecom infrastructure has decreased during the last 15 years, the gap has shifted significantly. The digital gap is greater between the least developed nations and the most developed countries in terms of broadband technologies.

Keywords- *ICT; Democracy; Education; Law; E-Business; Institutional Resistance; Broadband; Web 2.0; Digital Divide*

I. INTRODUCTION

From the birth of the Internet in the public domain, citizens across the globe have used digital communication technology not only as a means for faster, cheaper and yet more efficient ways to communicate, but also as a means to participate in public discourse. In this context, ICTs make it easier for not only citizen-to-citizen communication to prevail, but also for establishing communication and building relationships with other actors in the political arena or, as suggested by Percy-Smith [1] ICTs coupled with democracy in the form of so-called "e-democracy" have created a more participatory public forum. In addition, ICTs have provided effective channels for communication between and among social groups and individuals, particularly for the younger generation, marginalized groups, non-governmental organizations (NGOs), and other social factors such as intellectuals, elected representatives, government officials and public servants. ICTs have also enabled private sector and organizations in form of e-business to improve productivity by boosting their business activities, fostering research and innovation and reaching potential customers across the globe in more efficient and effective ways. As a result, it enables nations to promote development and economic growth and increase the standard of living [2]. ICTs have also provided opportunities to create new forms of governance such as e-government [3,4,5] and to promote public participation in the form of e-democracy [6,7].

In recent years, several empirical analyses based on case studies at both the micro and macro levels have stressed the positive impacts of new technology on socio-political and economic developments. In today's information age, there is a mutual relationship between ICT and the notion of an

information society in such a way that ICT is the infrastructure, the platform, and the backbone of human communication across the globe. But ICT itself is a product of the character of the societies that produced thus communities and their ICTs form an iterative relationship where a change in society results in a change in ICT and vice versa [8]. Pickerill [9] points out that certain networks have been able to move toward practices of participatory democracy, in that using ICTs significantly contributes to a citizen's ability to make their voice and opinions clearly heard. Many scholars have argued the positive correlation between ICT connectivity and democracy [1,10, 11,12,13,14]. In other words, ICTs have provided effective communication channels through which to participate in decision making processes. For example, citizens can use ICT applications such as e-mails, group discussion forums, e-petitions, SMS and/or the Web 2.0 applications used by social networking sites and blogs to interactively engage in dialogue with policymakers (e.g., using blog posts or comments to group discussions within social network sites as well as governmental websites) in order to raise their concerns about various issues or, as Ott [10] suggests, transporting the citizens' needs and wants to the elite; in other words, e-participating in communication discourse. E-participation, according to Sæbø et al. [14], is the citizens' use of ICTs like the Internet to access information and to participate in discourse. Information is the currency of democracy and as such, access to information is a key feature of the value placed on information [15].

This study extends an earlier empirical study conducted by [16] covering 133 economies for the period of 1995-2003. The current study includes more countries in the dataset, expands the time period of study as well as investigates the impacts of other parameters as discussed in the literature that may influence the relationship between ICTs and democratic freedoms. Parameters added to this study include the existing level of rule of law and legal entitlement, the level of economic growth as measured by per capita GDP as well as the institutional resistance in each nation. In addition, this study uses a three-stage least square (3SLS) structural equations on panel data to investigate the following research questions: a) what is the impact of ICT expansion on democracy and economic growth on a global scale; b) what is the impact of educational attainment on ICT expansion, democracy and economic growth; and c) what is the impact of institutional resistance on endogenous parameters such as ICT, democracy and per capita GDP. The rest of the paper is organized as follows: Section II presents the theoretical framework of this study. Section III discusses our research hypotheses and method. Section IV presents the results of our empirical analysis, and Section V provides analysis of the findings. Finally, Section VI discusses issues for future research.

II. ICT AND DEMOCRACY: AN E-DEMOCRACY FRAMEWORK

The recent wave of popular unrest in the Middle East and North Africa (MENA) against the longstanding dictators in the region and the important roles played by social media in mobilizing masses in these movements highlights the impact of ICTs on democratic discourse. These impacts, as noted by [17] are “beyond the information age and into the age of twenty-first century political communications” (p. 209).

A. Democracy

Some scholars argue that representative democracy has become necessary because it seems impossible to realize direct democracy by giving all citizens equal and direct opportunity to participate in the collective decision making process [11]. e-democracy has changed this landscape [17]. Norris points to three major characteristics of representative democracy: 1) pluralistic competition among parties and individuals for all positions of government power; 2) a participative feature that allows citizens equal opportunities in the selection of parties and representatives through free, fair, and periodic elections; and 3) civil and political liberties to speak, publish, assemble, and organize, necessary conditions to ensure effective competition and participation [18]. These characteristics focus particularly “upon how representative democracies function through free and fair elections, as the primary mechanism for holding governments accountable for their actions” (p. 7). Feng points out that the term *democracy* and *political freedom* is often used interchangeably in the literature [19]. According to Feng, *democracy* is meant to be the degree of liberal democracy consistent with the idea of an incremental state of democracy, rather than the idea of dichotomous state. In this context the institutions in question consist of three main components: political freedom, political stability and policy certainty.

However, democracies vary in how they achieve participation, decision making, equality, and transparency, and these very features of democracy promote variation; that is, when individuals participate in relatively equal roles, in open environments, new ideas and new forms of democracy can be envisioned and created [8]. In this context, democracy is rather a dynamic concept—it has been and continues to be interpreted and reinterpreted, invented and reinvented as the world changes, because of new technologies, new ideas, new knowledge, new venues, new circumstances, and many other factors that directly and indirectly impact human lives. The challenge of reinventing democracy today is the challenge of reinventing it from the perspective of ICTs [8].

B. E-democracy Framework

Snellen argues that the theory of democracy, which forms the foundation and legitimating of democratic practices, does not take the intermediary role of the bureaucracy into account [11]. However, ICTs have provided citizens with the ability to approach public servants directly thus bypassing traditional intermediary channels. On the other hand, politicians increasingly rely on the expertise, insights and analytical power of the bureaucracy due to the development of ICTs. Chadwick and May point out that ICTs are capable of reshaping structures of governance by providing citizens, civil society and the state more efficient (measured in speed of delivery and cost reduction) means for interaction, communication and participation within the context of democratic discourse [12]. In addition, ICTs encourage the transparency and accountability of representative bodies as well as encourage public bureaucrats to be more effective and efficient [11].

Thomas and Streib define e-democracy as a means of citizens’ online activities to communicate to government opinions or complaints related to public issues, independent of any commercial transaction [20]. In this context, e-citizens who engage in these online activities ultimately join in the democratic process by seeking to shape the development or implementation of public policies.

This study adapts Clift’s conceptual e-democracy model [21] to investigate the impact of ICTs on democratic freedoms across the world as well as its impact of economic growth as measured by GDP per capita. According to Clift, e-democracy is the use of ICT tools and services by “democratic sectors” within the context of local communities, states/regions, nations and on the global stage. Four main components of this model as depicted in Fig.1 are e-citizens, civil society, the private sector and the social, legal and political institutes (e.g., government, elected officials and the legal system).

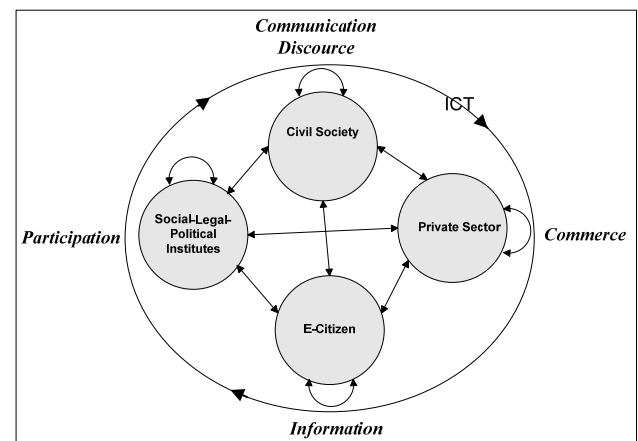


Fig. 1 E-democracy: ICT and democratic discourse

ICT tools and applications are used as the platform and infrastructure of e-democracy that not only connect members of each group but also connect all actors within our e-democracy model. In this model, e-citizens are the individuals who use ICTs to participate in democratization processes. This participation can take many different forms. For example, e-citizens can use ICTs to interact with social groups, government agencies and elected officials, media and private sectors as well as allowing for the use, creation and dissemination of information, demanding a more open and democratic society. The upsurge of websites, weblogs, social networks such as Facebook and Twitter, e-mails, and SMS among others has also improved communication and interaction among people across the globe and has assisted in opening up new possibilities for political participation [22, 23, 24, and 25]. As explained by Morrisett [26], ICTs can be used to enhance the democratic process in the form of an e-government, in which citizens are able to effectively impact the decision-making process in a timely manner within and between institutionally, politically or geographically-distinct networked communities.

ICTs make it possible for linking e-democracy to civil society with e-government at the local and national levels [12]. The main objective of civil societies, such as NGOs, women’s groups, trade unions, human rights groups and independent media groups is to use ICTs in the pursuit of “good governance” [5] and democratic development. In addition, political groups are able to use ICTs to promote their political agendas and run online advocacy and political campaigns [21]. As such, it is evident that ICT expansion facilitates the growth

and development of new communities by coordinating individuals into groups which can express protestation and grief over socio-political oppression.

Norris [18] points out that, ICTs may serve multiple internal administrative and organizational functions for parties, linking them horizontally as well as vertically. For example, social networking and video sharing sites such as Facebook, Twitter and Facebook along with tools such as e-mail, SMS and online conferencing are widely used for strengthening communications among and between citizens, non-governmental organizations (NGOs), political parties, media and elected officials. Pina et al. [13] argues that in many countries, ICTs will bring a shift from the traditional accountability process to a new stage of openness, transparency and accountability of public administration and will therefore increase the degree of interest and involvement of citizens in politics and communication discourse. Salton and Becker [17] point out four major innovations provided by ICTs that increase citizens' participation within the context of representative democracy and for the sake of creating more effective direct democracy in this system. These innovations are: a) voting from home; b) scientific deliberative polling; c) electronic town meetings; and d) direct democracy activities.

The extensive use of the Internet in political campaigns in the 2008 U.S. presidential election and in many other countries' elections is evidence of the role of the Internet in attracting citizens—particularly the younger generation—in engaging in the democratic process and encouraging first-time voters to participate in elections. Riley [27] points out that in the UK, the government hopes to use the Internet and e-voting in order to bring youth into the democratic process since their participation in elections is generally very low. Smith argues that this long-standing pattern could be changed because of the increased civic engagement anchored through applications such as blogs and social networking sites [28]. In this context, citizens who have access to ICTs are more likely to participate in political processes and public debate which may result in political action in an institutionalized form such as voting or outside conventional political structures in the form of mass demonstrations [29].

The use of ICTs by government to deliver policies to the public sphere brings us to the notion of e-government. Brown argues that e-government encompasses all government roles and activities, is shaped by ICTs and builds upon three evolving forces: technology, management concepts and government [30]. E-government includes four domains of governance and public administration, namely the state's economic and social programs; its relationships with the citizen and the rule of law (e-democracy); its internal operations and its relationship with the international communities and organizations. The four components of e-government will have lasting effects on public administration including the delivery of citizen-centric services, information as a public resource, new skills and working relationships, and accountability and management which has given rise to several phenomena by redefining the public sector environment, including the international organizations and collaborations [30]. Other scholars argue that e-government is more responsive and connects citizens so that they can meet the challenges of building a more sustainable society [3, 31, and 32].

Finally, the private sector in our e-democracy model is not only representing commercially-driven connectivity in form of e-Business and Business-to-Business (B2B) relationships and

connectivity but this sector is the main provider and developer of ICTs. The growth and expansion of e-commerce and online transactions have enabled ICTs to become a core component of economic development. It is also anticipated that ICT expansion will improve the efficiency of the industrial infrastructure in developing countries; thus, enhancing their overall economic performance and strengthening their competitive capacities in the global market [33, 34, 35, and 36].

III. RESEARCH APPROACH

This study seeks to investigate three prominent questions: a) what is the impact of ICT expansion on democracy and economic growth on a global scale; b) what is the impact of educational attainment on ICT expansion, democracy, and economic growth; and c) what is the impact of institutional resistance on endogenous parameters such as ICT, democracy and per capita GDP. Based on the research framework depicted in Fig. 1 and drawing from previous literature, this study was designed to assess the impact of ICTs and other determinant variables on democratic freedoms across the globe. At the centre of our model is the dependent variable democracy (*democ*), which consists of the institutional structures of each country as being measured by the degree of citizens' civil liberties and political rights. It is also argued that there is a strong correlation between a country's development in ICT, its income, and the level of human development as measured by its GDP per capita (*GDPP*) and the level of education (*edu*) of its citizens [37,38,39]. As such, it has been assumed that ICT expansion will contribute to improvement in the provision of basic living conditions, help to boost economic development, improve the efficiency of governments and enhance the provision of education and health [40].

The existing level of institutional legal environment (*law*) in a country is not only relevant to ICT expansion in form of independent ICT regulatory body but also to economic development in general. For the rule of law in particular, a democratic legal entitlement will ensure respect for private business activities, freedom of trade and ensures free and fair business competition at both the local and global scales. It is expected that citizens living in countries with a progressive rule of law have better opportunities to engage in business activities based on the quality of the rules of society including property rights, the quality of law enforcement and the courts and the contract enforcement. As such we can expect countries with advanced and progressive legal settings to contribute more to economic development as measured by GDP [19].

Finally, the level of institutional resistance (*resist*) in business activities in the form of government consumption as a percentage of the economy, government ownership of businesses and industries, the share of government revenues from state-owned enterprises, and government ownership of property and economic output produced by the government [41] not only impose negative influences on ICT expansion, and economic growth but also undermine the spirit of freedom of trade, freedom of private business activity and the very foundations of democracy. It is important to note that in this study the term "institutional resistance" is not meant to imply that the government avoids involvement in the development of infrastructure. Rather, the term assumes that the government is a main player in business activities as was the case in the former Eastern Bloc and other developing countries such as China, North Korea, Cuba and Iran.

To investigate the model we posited five hypotheses:

- H1:** ICT tools and services are positively correlated with democracy (*democ*), as the usage ICTs in a society increases, citizens are more engaged in the political decision making processes and as such the level of democratic freedom will also increase;
- H2:** the increased level of imposed institutional resistance in a society is negatively correlated with democracy (H2a) and economic growth (H2b);
- H3:** ICT expansion has a positive impact on economic growth as measured by GDPP which in turn has a positive impact on democracy;
- H4:** the existing level of rule of law in each nation will directly impact the economic growth as measured by GDPP in each nation which in turn has a positive impact on democracy;
- H5:** a higher level of education is positively correlated with ICTs which in turn has a positive impact on democracy.

A. Data Collection

ICT index (*ict*) is composed of indices such as the number of fixed Internet users, fixed telephone lines, the number of PCs, the number of mobile users, the number of broadband Internet users and the number of mobile broadband users per 100 inhabitants. Data for the above indices were collected from the International Telecommunication Union (ITU). The democracy index (*democ*) is a composite index of Political Rights (PR) and Civil Liberties (CL) obtained from Freedom of House (www.freedomhouse.org) and two other indices related to nations' media freedom rankings from Freedom House and Reporters without Borders (www.rsf.org). Freedom House ranks each country's level of Political Rights and Civil Liberties on a scale from one to seven, where one represents the highest degree of democracy and seven the lowest. While this ranking method provides a sound metric that presents an overall review of the world's progress towards democracy, it obscures the details of the annual performance of each country. To overcome the problem the media freedom, indices from the above sources were included as a barometer to better rank each country's progress towards democratic freedom. A rescaling of values was conducted to indicate one as the lowest rating of democratic freedom and 100, the highest. The growth rate of GDP per capita (*GDPP*) and education index (*edu*) which is a combination of the adult literacy rate and the gross enrolment ratios (primary, secondary and tertiary education levels) were obtained from the United Nations Common Database. The index of rule of law (*law*) was obtained from the World Bank's database and the Freedom House. While the former rates each country's adherence to the rule of law on a scale of -2.5 to 2.5, where -2.5 represents the worst legal environment and 2.5 represents the most progressive. Freedom House ranks each country's adherence to the rule of law based on a scaling score of zero to seven where zero represents the weakest and seven represents the strongest performance of rule of law. For the purposes of this study, a rescaling and conversion of this index was performed to indicate one as the lowest legal environment and one hundred as the highest. Finally, the index of institutional resistance which is a reference to the level of governmental intervention in economic activities was obtained from the Heritage Foundation (www.heritage.org). A score of one indicates the least institutional resistance and a score of one hundred indicates the highest level of resistance.

B. Model Estimation

To empirically assess the impact of ICT, institutional resistance and economic growth as measure by per capita GDP

on democratic freedom, a panel data of 2,190 observations covering 146 countries for the period between 1996 and 2010 was used. In the estimates, we seek to capture the link between the above variables and democracy by using the following reduced form equation,

$$democ_{it} = \alpha_0 + \alpha_1 \ln ict_{it} + \alpha_2 X_{it} + \alpha_3 Y_{it} + \varepsilon_{it} \quad (1)$$

where the subscripts refer to country (i) and year (t). We assume that the index of democracy (*democ*) depends on the ICT index (*ict*) (H1), the index of institutional resistance (H2a) and two endogenous variables X and Y. While the endogenous variable X controls for the impacts of ICTs (H3), the rule of law (H4) and institutional resistance (H2b) on the annual average growth rate of GDP per capita (*gdpp*), variable Y controls for the impact of educational attainment (H5) in each country on the expansion and usage of ICTs. Also, α_0 is a constant, α_1 through α_3 are variable coefficients and ε is the error term.

To estimate Equations (1), a three-stage least squares (3SLS) estimate, which is a set of nonlinear equations, was applied to the panel data. According to Lee and Lee [42], this method is a full information method which takes into account information from a complete system of M structural equations (see also [43] for more details) in the form of a variance-covariance matrix; hence, it is more efficient than other regression methods such as the Ordinary Least Square (OLS) regression. The main drawback of OLS is its assumption of the constancy of model's error unrelated to the regressors, which in some cases is unable to deliver consistent parameter estimates when issues related to omitted variables, or errors in variables, or measurement error in independent variables arises [44]. In contrast, the 3SLS estimation model is robust enough to account for small changes in conditioning parameters and the fact that the estimation model is based on systems of structural equations, where some equations contain endogenous variables among the explanatory variables. In essence, as argued by Dhrymes [45] 3SLS provides a full information maximum likelihood (FIML) of the system under investigation.

IV. EMPIRICAL RESULTS

Table I shows the results of estimating Equations (1), in which we assessed the relationships between ICT, GDPP, institutional resistance and democracy.

As Table I indicates, the *p* values for all the variables show a value of zero to reject a null hypothesis condition of ($P > |z| > 0.05$). The model fit statistic, R^2 , for endogenous variables *democ* and X and Y are reported as 0.4082, 0.7664 and 0.6380 respectively.

As shown in Table I, the log value of variable *ict* shows a positive value for the regression coefficient indicating its positive impact on democracy globally. And this impact is statistically significant at the 99% level. Thus, the condition to support H1 claim is fulfilled. The same relation is true in regards to the relationship between variables *ict* (H3) and *law* (H4) and log GDPP (positive coefficients, strong z-values and positive correlations) on the one hand and between ICT and education (H5) on the other. Thus the results from the regression support the claims described in hypotheses H3 and H5. In other words, we can accept the claim that the level of citizen's educational attainment is positively correlated with ICT expansion and use and that ICT has a positive impact on

democracy and economic growth (as measured by GDPP) globally. Also as shown in Table I, variable law shows a positive sign with regards to the growth of per capita GDP indicating its positive impact on GDPP and this impact is statistically significant. However, the variable *resist* shows a negative coefficient along with negative z-value and negative correlation with *democracy* (H2a) and *gdp* growth (H2b) confirming that institutional resistance imposes negative influences on the above endogenous variables.

TABLE I REGRESSION RESULTS

Hypothesis	Equations	Obs	R-square	P
H1, H2a	democ	2190	0.4082	0.000
H2b, H3, H4	X	2190	0.7664	0.000
H5	Y	2190	0.636	0.000
Model VIF: 2.35				
Hypothesis	democ	Coef.	Std. Err.	P> z
H1	ict	8.683973	0.238251	0.000
H2a	resistance	-0.03102	0.014695	0.035
	_cons	27.98869	1.563	0.000
	$X = f(gdpp)$			
H2a	resistance	-0.00543	0.001	0.000
H3	ict	0.697017	0.017	0.000
H4	law	0.496048	0.025	0.000
	_cons	6.019635	0.084638	0.000
	$Y = f(ict)$			
H5	edu	0.065241	0.001	0.000
	_cons	-0.84446	0.073	0.000
Endogenous variables: democ, X and Y				
Exogenous variables: resistance edu law				
Note: ICT and GDPP in log format				

Finally, as indicated in Table I, our model's Variance Inflation Factor (VIF) which a measure of the level of multicollinearity among variables shows a value of 2.35 which is far from the critical value of 30 (sever multicollinearity).

As to ICTs and democracy, we have a regional analysis. Table II below shows the results of our regressions from a regional analysis perspective. As shown, ICT has a strong positive impact on democratic freedoms (H1) and on GDPP growth (H3) and this impact is statistically significant at 99% level. The results indicate also the important role of education on the expansion and use of ICTs (H5) and this impact for is statistically significant at the 99% level across all continents and as well as two regions of our interest: Eastern Europe and MENA. The reasons for including these two regions in our analysis are the important roles of ICT tools and services such as the Internet played in democratic discourse in late 20th century and early 21st century in some of the countries in the Easter Bloc as well as the recent wave of popular unrests in the Middle East and North Africa region as disused in earlier sections.

The correlation between the institutional resistance and democratic freedoms (H2a) across regions varies to a great extend. For example, while this impact negatively influences democratic freedoms in Africa, Asia and Oceania regions, however, this impact on Americas and Europe continents is

reported as statistically insignificant (see Table II). Also, during the period of this study, except for Africa the institutional resistance (H2b) had negative influences on economic development as measured by per capita GDP on all other regions. And this impact is statistically significant. The same is true with regards to the impact of the rule of law on economic development. Except for Africa this impact is positively correlated with per capita GDP growth.

TABLE II REGIONAL RESULTS

	ICT-> Democ	Institutional Resistance		ICT-> GDPP	Law	Education	
Hypothesis	H1	H2a	H2b	H3	H4	H5	Obs
Africa	5.3459 (0.000)**	0.1084 (0.001)*	-0.0009 (0.636)	0.8741 (0.000)**	-0.0291 (0.575)	0.0605 (0.000)**	645
Americas	9.6411 (0.000)**	0.2078 (0.096)	-0.0035 (0.015)*	0.7543 (0.000)**	0.3427 (0.000)**	0.0656 (0.000)**	405
Asia & Oceania	10.6097 (0.000)**	-0.0960 (0.003)**	-0.0117 (0.000)**	0.5075 (0.000)**	0.8335 (0.000)**	0.0716 (0.000)**	600
Europe	12.5672 (0.000)**	-0.0323 (0.267)	-0.0037 (0.002)*	0.5590 (0.000)**	0.6411 (0.000)	0.0829 (0.000)**	540
East Europe	9.2389 (0.000)**	-0.1853 (0.003)*	-0.0134 (0.000)**	0.8123 (0.000)**	-0.068 (0.408)	0.1029 (0.000)**	150
MENA	6.9611 (0.000)**	-0.01642 (0.717)	-0.0138 (0.000)**	0.6296 (0.000)**	0.5832 (0.000)**	0.0826 (0.000)**	255

Fig. 2 below shows a snapshot of the relationship between ICT and democracy across the regions of the globe.

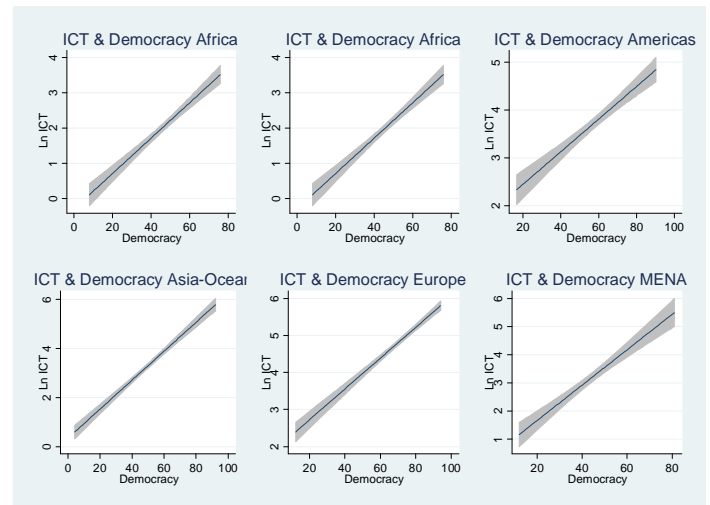


Fig. 2 ICT and democratic freedoms across regions

The results of this study reveal important information regarding the significant impacts of ICTs on democratic freedom and economic growth as well as the role of education in moderating such impacts. This study is among the first global studies demonstrated these impacts at the 99% level on a global, continental and regional scales.

V. THE E-DEMOCRACY INDEX

Based on our e-democracy framework introduced in Section II, we can now obtain an output vector from Equation (1). This vector includes all main variables used in this study. The output vector enables us to rank each country's e-democracy performance on a global scale for the period of 1996-2010.

The resultant vector provides valuable information with regards to e-democracy performance. For example, while the mean value of our e-democracy index shows a value of 48.5 for year 1996, this value has been increased to 59.1 in 2010, indicating an increase in e-democracy development by 10.6 units during the past 15 years.

To analyze this performance on a global stage, countries are divided into five different categories as follows:

a) front-runners: countries which e-democracy value above 90% have very high levels of ICT development where citizens enjoy an elevated level of social, legal, economic and political freedom;

b) above normal: countries with an e-democracy value between above 60% to 90% have high levels of ICT development where citizens enjoy an admirable degree of social, legal, economic and political freedom;

c) normal: countries with an e-democracy index around the average level of the world's e-democracy;

d) below normal: countries with which their e-democracy index is below the world average with a potential to move on to a higher e-democracy category but either exercise poorer performance in their socio-political freedom and/or have a lower e-democracy index in terms of both ICT development and citizens participation in e-democracy process; and

e) low performers: countries with an e-democracy opportunity index below 40%; they have a poor performance record concerning both ICT development and social-political, legal and economic development. Many countries in Africa and Asia classified as the Least Developed Countries (LDCs) are located in this category. Within this category, however, there are countries that perform much better in their economic and ICT development which result in a higher ranking, as well as countries that do not show any improvement in their e-democracy performance or changes in their e-democracy index is very small, despite citizen involvement in the e-democracy process.

Table III shows the distribution countries of this study with regards to the above categories.

TABLE III CATEGORIES OF E-DEMOCRACIES

Low Performers	Below Normal	Normal	Above Normal	Front Runners	Total
51	24	9	47	15	146
45	30	9	38	24	146

At a glance, as indicated in Fig. 3, we can observe a notable progress in terms of e-democracy index during the period of 1996-2010. A closer analysis of individual countries may reveal useful information for various interest groups, policymakers as well as researchers investigating the role of ICTs on socio-economic and political developments.

Among the countries that joined the front-runners category in 2010, we can see economies such as United States (despite the country's economic crisis in recent years), Chile, Malta, Belgium, France, Hong Kong, and Singapore. The latter two nations positioned themselves in this category mainly because of their performances in economic development, the rule of law, citizen's educational attainment as well as ICT development.

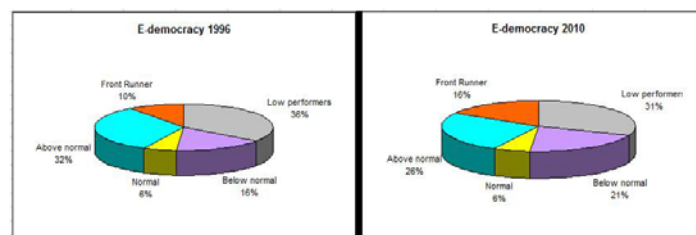


Fig. 3 E-democracy performance in 1996 vs. 2010

In addition, we can observe countries that are placed close to a higher ranking category to enter into this category faster than other nations based on their past performances. Among these nations, Argentina, Mexico, Belize and Colombia from Latin America; India, China, Thailand and Malaysia from Asia are expected to be placed in a higher ranking category. Also countries such as South Korea and Japan in Asia and the European countries such as Spain, Cyprus, Slovenia, Hungary and Latvia are expected to be placed in the front runner e-democracy.

A. Inverse Transition

While the overall performance of e-democracies across the globe was a transition to higher level categories in particular among countries from Asia, Americas and Europe, we were also witness an inverse trend among some of the countries of this study in which these countries were placed to a lower ranking category in year 2010 in comparison to their previous global ranking. Countries such as Iran, Fiji and Belarus are among these economies. For example during the last fifteen years, Iran had a decline in its performance in all variables of this study. This decline was a product of the decreased level of citizens' civil and political, the level of rules of law, as well as the increased level of governmental and military involvement in economic activities as measured by the index of institutional resistance. Finally the slow pace of ICT development contributed to countries low performance in e-democracy..

B. The Digital Divides

The majority of nations located in low performers' category are the least developed nations from Africa and Asia including Haiti. The majority of these countries remained in this category in year 2010.

Despite differences between countries in terms of their level of ICT development, the rule of law, civil and political rights and institutional resistance, all countries suffer from development of ICTs particularly in the area of broadband technology. The new information age economy demands countries' development in the area of broadband (Internet and mobile). For example, today's e-business transactions and activities require reliable and fast network infrastructure and application (e.g., e-banking, B2B etc). In addition, areas such as e-government, health, education and research and development (R&D) require broadband infrastructure needed to run Web 2.0 applications. Finally citizens' effective engagement in communication discourse using social network and video sharing sites such as Facebook, Twitter, and YouTube require access to faster and yet more reliable networks.

During the last fifteen years while we were witness for enormous expansion of ICTs globally in particular in the area of telecom infrastructure development, we were also witness to a growing digital divide in the area of broadband mobile and Internet technologies. To access the digital gap, two metrics

were considered. The first measure was the ICT price basket introduced by ITU and the second was the Internet download quality and speed from Netindex.com. According to ITU's 2010 report, the ICT price basket is a measure the cost of access to ICT services in each country relative to its ICT development. As mentioned in the above report, citizens' in developed countries have to spend relatively less of their income on ICT services than citizens' in least developed nation. The fixed broadband access in particular is the most expensive and least affordable service in many developing countries in particular least developed ones [46]. The second measure used to assess the digital divide is the quality of ICT services offered in these countries.

The poor quality of broadband access in least developed ICT countries makes it difficult for many organizations and private firms to develop their business strategic using ICT applications and services. As shown in Table IV on average citizens' in fourteen least developed countries need to pay over 21.5 times more of their income to gain access to broadband services in compared to fourteen most ICT developed nations. In addition, as shown in the above table people in developed nations enjoy not only much cheaper ICT prices but also they enjoy 8.4 times faster Internet access (as measured by the Internet download speed) compared with citizens' in the least developed nations.

TABLE IV ICT PRICE BASKET AND BROADBAND

Least Developed Economies	Fixed Broadband (%of GNI)	Fixed Broadband (PPP\$)	Internet Download (Mbps)	Most Developed Economies	Fixed Broadband (%of GNI)	Fixed Broadband (PPP\$)	Internet Download (Mbps)
Nigeria	108.61	197.35	1.57	United States	0.5	19.95	11.36
Mali	114.61	91.55	1.12	Singapore	0.58	21.98	15.54
Bangladesh	116.31	135.91	0.77	Denmark	0.59	17.16	16.09
Tanzania	173.35	180.03	1.36	Luxembourg	0.59	30.02	13.03
Burkina Faso	228.13	204.36	1.05	Switzerland	0.6	20.86	20.94
Rwanda	257.64	203.79	6.47	United Kingdom	0.63	22.87	10.9
Mozambique	260.22	174.45	1.8	Norway	0.7	32.67	14.68
Uzbekistan	263.03	588.42	1.84	Canada	0.71	21.95	10.09
Madagascar	297.23	243.56	1.23	Australia	0.77	20.18	7.99
Lao P.D.R.	315.12	467.6	1.65	Belgium	0.78	21.74	16.9
Swaziland	408.56	1691.69	1.11	Sweden	0.84	27.13	26.39
Uganda	555.35	557.98	1.32	Netherlands	0.87	28.59	23.1
Tajikistan	727.27	1183.63	2.74	Ireland	0.88	25.71	6.96

VI. CONCLUSION

In this study we have demonstrated that there is a very high correlation between ICT expansion and democratic freedoms. We have also demonstrated that institutional resistance has a significantly negative impact on democratic freedoms, ICT expansion and economic growth as measured by GDP. In general, ICT infrastructure expansion has had a positive impact on democracy and freedom of expression. New ICTs, in the form of social networking sites has fostered an alternative way of accessing free information, disseminating opinions, thoughts, and ideas, and organizing social/political events. More specifically, these media have become a means through which the younger generation engages in democratic discourse.

These technologies have also changed the nature of interaction among individuals, civil society, democratic institutes and business activities. In particular, many individuals and protest movements were organized by utilizing ICTs in their campaigns. ICTs provide the means for building the capacity to participate in democratic discourse, mobilize masses for radical social change in constitutional and legal arrangements.

Individuals can now more easily engage in discussions with individuals without the constraints of time and space. The explosion of websites, weblogs, e-mails, and SMS has also improved communication and interaction among people across the globe and has opened up new possibilities for political participation [24, 25, and 47]. This research had also some

limitations resulting from the macro level analysis of e-democracy as such the study did not examine any case studies of individual countries to understand the nature of the ICT development and its impacts on economic growth and democracy. As such, future research should investigate in-depth micro-level field studies in order to better understand the potential causal relationships among the variables used this study as well as other variables that may directly or indirectly impact the relations between ICTs, economic growth and political freedom.

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